Achieving Sustainability of e-Government Projects in Developing Nations

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Abstract

In the rapidly developing world governments are thriving to become efficient and effective in the ways of delivering services to their citizens. Developing countries are funded by various bodies/developed countries to implement successful e-government projects to serve this need. However, in Sri Lanka most of the completed e-government systems are not being used by the end users, thus e-government projects' sustainability is a major concern. In this research we analyse four e-government projects; two successes and two failures to derive factors affecting the sustainability of a project. It was identified that approach, method of deployment and user involvement are the critical success factors for e-government sustainability. We acknowledge that the approach should be bottom-up, method should be incremental and it is important to interact with all the stakeholders in each phase. With this we derive a framework for sustainability of e-government projects.

Keywords

E-government, sustainability, case study research, developing countries, business process re-engineering.

INTRODUCTION

In recent years, the revolution of information and communication technology (ICT) has transformed the way of living around the world by influencing the society beyond time and distance (United Nations 2012). ICTs have opened up many positive opportunities to governments to provide their services in innovative and effective ways. Electronic government (e-government) leads to human well-being by providing fast, convenient and transparent services to citizens. According to the United Nations E-government Readiness Index 2012, Sri Lanka is listed as 115 in 2012 and it is a lower ranking compared to 2010 ranking of 111. From 2010 to 2012 Sri Lanka's e-participation index has increased from 0.0476 to 0.0789 (United Nations 2012). However, Republic of Korea being a recently developed country has an index of 1.0000. Although, the e-participation index has been increasing over past few years, ranking shows, Sri Lanka is not very successful in e-government development compared to other countries. In Sri Lanka there are many funding bodies who are willingly involved in funding e-government projects aiming development of the country. Some of them are ICTA (Information Communication and Technology Agency), SIDA (Swedish International Development Corporation Agency) and ADB (Asian Development Bank). Even though fully funded, there are many reported cases of project failures

and stoppage. This may result in de-motivating the funding agencies and could have adverse effects on the countries development in the long run. Thus long-term sustainability of e-government initiatives is important to countries development in multiple aspects.

In this research we define sustainability as "the long-term use of the implemented e-Government solutions" (Kumar and Best 2006, Nurdin et al. 2014). Sustainability can be identified as a significant concern in Sri Lankan e-government projects, because most of the projects have terminated due to stoppage of functionally completed systems. In this study, we assess four e-government projects, two successes and two failures, and identify barriers and best practices. All these projects were fully or partly consulted by a set of experienced consultants from a Sri Lankan state university. During the preliminary interviews had with project consultants, it was understood that lack of engagement of e-Government stakeholders and continuous evaluation are the most effected factors on the sustainability of e-Government projects in Sri Lanka. In the literature section we have discussed the implementation models and stakeholder interactions identified by previous researchers. Based on a comprehensive case study analysis we are proposing a life cycle model and a stakeholder interactions bottom up approach to achieve sustainability of e-government projects in developing countries.

LITERATURE SURVEY

Most of the e-services commenced through e-Sri Lanka program are still at the initial stages after massive amount of investment from government and funding organizations (Karunasena and Deng 2010). Sustainability is a key challenge in any system development project because they change processes, environments, behaviors of persons and the way of living (Lee and Casalegno 2010). Sustainability strategies have to be continued throughout the lifecycle of e-government implementation (Martín and Montagna 2006). According to the results by Nawi at el. (2013), lack of planning, monitoring and control, and not meeting user requirements are the most influencing sustainability failure factors. Information systems require human capital and effort for continuous evaluations and maintenance in order to sustain and minimize delays (Nurdin et al. 2014, Karunasena and Deng 2010). Specifically e-government projects fail due to complexity and influence of political processes (Priyatma 2008).

Interactions between all the related stakeholders highly impact on successful e-governance. Strong and sustained commitment of leadership, adequate training provided to the system users, continuous evaluation and monitoring until the manual process will be fully replaced by the new system are considered as important factors (Kumar and Best 2006). In addition, private partners need to work consistently with government stakeholders while overcoming cultural barriers (Kumar and Best 2006). The continued use of a newly introduced system depends mainly on the acceptance of changes by its consumers (Lee and Casalegno 2010). According to Lee and Casalegno (2010), the collaboration of academic researchers and policy makers is important to select appropriate business strategies. Understanding the product service portfolio, ownership structure from government decision makers to citizens and centralization decentralization of government processes can be identified as key dimensions for sustainability business models (Lee and Casalegno 2010). User (citizen), regulator, service provider and implementer are identified as four groups of stakeholders of e-service initiatives (Nawi at el. 2013). As identified by Nurdin et al. (2014) e-government users can be government employees, citizens, politicians, private entities such as businesses and non-profit organizations. IT departments in government organizations, policy makers and vendors are identified as stakeholders who are involved in e-government implementation process. They have divided these persons into five main categories namely; central government, other government, local stakeholders, politicians and employees (Nurdin et al. 2014). Those were identified as the social actors of e-government sustainability in Indonesian Regencies. In their study of relations among government stakeholders in m-government, Lanza and Cunha (2012) had identified six different roles played by different stakeholders in Paraná, Brazil. They are the SMS hirer, content provider, m-government disseminator, solution developer, broker and SMS provider. Most of these stakeholders are suitable for m-government rather than e-government. From the above literature on e-Government stakeholders it is understood that they are mostly context specific. Therefore, it is required to identify the stakeholders and their interactions specific to Sri Lankan context.

Although, it is difficult to employ the methodologies used in other disciplines or developed countries to implement e-government services in developing countries (Basu 2004). Here we discuss implementation methodologies used by previous researchers in similar scenarios. Ebrahim and Irani (2005) has suggested a business process management model which can be aligned with the IT infrastructure in public sector organisations. They have identified four layers namely; access layer, e-government layer, e-business layer and infrastructure later in their architecture framework of e-government. Although it is a completed framework, it might not be applicable in developing countries due to lack of infrastructure and technology development. Ravesteyn and Jansen (2009) has proposed a situational implementation approach for business process management (BPM). They have studied existing BPM implementation approaches and decided they won't be

applicable in their context and developed a comprehensive framework which addressed their needs in depth. It motivated us to search for the related work in developing countries. Dharmasena et al. have suggested an evidence based business process re-engineering model for e-government based on a Sri Lankan case study. The whole process was divided into sub processes in order to implement in an iterative manner (Dharmasena et al. 2013). Although this is a similar study, this approach could not be directly applied for any e-Government project, as it specifically addresses business process re-engineering projects. Cullen and Hassall (2013) have suggested a framework which could develop locally and culturally relevant policies for sustainable and effective e-governance. They have considered information management practices; including information flows, information users and political conflicts that influence on online availability of information (Cullen and Hassall 2013). E-government readiness in the aspects of infrastructure, policies, e-literacy and trust are also important for technology implementation and continuation (Almarabeh and AbuAli 2010). Gunawong and Gao (2010) have said that it is important to have a talented person to analyze and anticipate the success or failure of an e-government project. Janssen at el. (2005) have proposed that public sector organizations could collaborate with experts to get timely knowledge and resources.

Many researchers have explained the important processes and the relationships between stakeholders. Various studies indicate a gap of literature to assure sustainability in e-government projects as most of them tend to fail after completion of the system development (Lemma et al. 2011, Nawi at el. 2013, Martín and Montagna 2006). It is evident that there is a need for sustainable e-government practices in developing countries like Sri Lanka.

RESEARCH DESIGN

This study is conducted with the use of qualitative research methods. We used the six steps for sustainability development proposed by Ahmed and Sundaram (2007) when developing this model. Nevertheless the iterative order of their model is customized to match our context. In the literature section we identified the success factors, barriers and sustainable business models discussed by previous researchers. Amongst those factors; continuous evaluation and stakeholder interactions are the significant factors affecting the Sri Lankan context as we understood during the preliminary interviews.

A comprehensive case study analysis is carried out to identify sustainability requirements, stakeholders, their interactions and continuous business processes in Sri Lanka. Two successes and two failures were analyzed using cross case analysis methods (Yin, 2009). Systems that have been implemented and used by the satisfied end users were taken as successes. Whereas, functionally completed systems that have not been implemented or used were taken as failures. The data required was collected through semi-structured interviews, observations and relevant documentation they have formulated for the projects. We collected the general information such as system type, current status, users, stakeholders and a small description. Semi-structured interviews were conducted accordingly based on the questionnaire given in Appendix 1. When developing this we adopted the questionnaire from the PhD thesis entitled "People and Methodologies in Software Development" (Cockburn 2003). Project names and some specific information are anonymised in the data presentation to ensure participants confidentiality. We interviewed 7-15 people who played different roles, specifically; system developers, users and consultants. Consultants are from government universities and research agencies. Systems are developed by public and private sector software development firms. We could not talk to the developers of Case B as they are a foreign company who refused to give information.

A summary of selected cases is given in Table 1.

Table 1. Selected cases

Case	Description	System type	Current status	Interview participants		
				Developers	Users	Consultants
A	e-Health system for state-owned hospitals	Innovative	Completed, not using	4	2	1
B	Asset management system for a large scale state-owned organization	BPR	Completed, not using	_	10	1
C	Management information system (MIS) for a large scale state-owned organization	BPR	Partly completed, using	4	10	1
D	Information system for a large scale state-owned organization	Innovative	Completed, using	4	2	1

Case A: e-Health system

Case A is a remote patient care system for rural areas in Sri Lanka. The purpose is to treat rural patients with specialist care. The system involves a specialist doctor and a peripheral clinic. It connects a base hospital and a district hospital to give specialist consultancy to rural areas. This remote system could reduce the cost and take the maximum usage of available human resources. The idea was to link a specialist doctor in a general hospital in a city with a patient in a rural area via a general doctor by integrating affordable current technologies. The district hospital serves as a e-clinic for base hospitals to provide specialist e-consultation services. As the first attempt, the system was implemented connecting a base hospital in a rural village and the main district hospital in that area.

The project was initiated by a state university and a funding agency. They collaborated with the specialist doctors from state health sector from the beginning of the project to understand the requirement. This patient centric approach was developed by a team of IT professionals and specialist doctors. As we understood, there were no records of them involved with doctors in rural hospitals or patients at the developing stages. Although the system was developed with state of the art technology and funded by the stage agencies, patients had not taken the advantage. Thus, currently the system is not functioning.

E-government stakeholders and their involvement related to case A is given in Table 2.

Table 2. E-government stakeholders in case A

E-government stakeholders	In this case	Involvement
Service receiver	Patient (citizen)	Receiving healthcare services
Service provider	Specialist doctor	Requirement identification, system design, test, providing treatment
	Rural doctor	Providing treatment
System developer	State university	Requirement identification, system design, system development and implementation
Top level management	Governors/ Politicians	Decision making
Consultants	State university	Innovative ideas
	Government agency	Procurement handling

Case B: Asset management system

Case B is an asset management system for a large scale state-owned organization. The purpose of the system is to handle day to day transactions within the organization and services to citizens. This organization consists of twelve regional offices operating all over the country, providing services to over 1,300,000 citizens. Regularly, they handle functions such as billing, recoveries, financial accounting, treasury management, stores and inventory, management information systems, tenders, community development and research.

System requirement specification (SRS) was done by the IT department of the organization with the input from the top management. In 2001, they have purchased a fully featured system from a foreign vendor and implemented all at once. People at the IT department were trained to handle the whole system by the foreign supplier. IT department was responsible of training the entire organization including staff at regional officers. During training sessions, IT team understood that some components have to be customized in order to match the real requirements. Except very few general modules such as financial accounting and stores and inventory; others could not use as they were. Then they negotiated with the vendor to get the source code as the customization charges were not affordable. Since they refused to give the source code, after spending few millions for a full-featured asset management system, they are still handling most of the things manually.

E-government stakeholders and their involvement related to case B is given in Table 3.

Table 3. E-government stakeholders in case B

E-government stakeholders	In this case	Involvement
Service receiver	General public (citizens)	Receiving services such as registration, billing and usage reports

Service provider	Employees	Training, providing services
System developer	Foreign company	Requirement identification, system design, system development and implementation, training
Top level management	Governors/ Politicians	Formulating policies
Consultants	IT department	Requirement identification, implementation support, training
	State university	Overlooking and advisory services

Case C: Motor traffic department

Case C is a management information system for a large scale state owned organization. The need for automation came from the lower level employees who were unable to satisfy long queues of citizens every day. This system includes government to citizen, government to businesses and government to employees services. The system was implemented with the involvement of reputed consultants, funding agencies and system developers.

In 1998, the consultants have done the system requirement specification by analysing all the processes while interviewing all the stakeholders of the system from top management to bottom level employees and citizens. They have followed an incremental approach for business process re-engineering (BPR). Few vendors were selected and out sourced the development work step by step. Consultants, with the input from department employees, have selected more critical processes to implement at the first phase. First, the process of issuing driving licenses was implemented successfully. At present, more than seventy percent (70%) of all functions are implemented and used by the end users. Their plan is to replace all the manual processes by the end of 2015.

E-government stakeholders and their involvement related to case C is given in Table 4.

Table 4. E-government stakeholders in case C

E-government stakeholders	In this case	Involvement
Service receiver	General public (citizens)	Requirement identification, receiving services such as vehicle registration and driving licenses
Service provider	Employees	Requirement identification, system testing, training, providing services
System developer	Local vendors	Requirement identification, system design, system development and implementation, training, maintenance
Top level management	Governors/ Politicians	Decision making, financial support
Consultants	IT department	Requirement identification, implementation support, training
	Government agency	Procurement advisory, vendor selection
	State university	Overlooking and advisory services

Case D: The Automated Fingerprint Identification System (AFIS)

Case D is an automated finger print identification system for Sri Lanka police. The purpose of the system is to help law enforcement authorities to identify and apprehend criminals. The initial requirement for an automated system came from the employees who were struggling to match and identify a large number of finger prints manually. The project was done by a partnership of a state university and a funding agency.

In the 106 year old manual system took a period of one to fourteen (1-14) days to give a 10-print finger print police report. With the introduction of this innovative system in 2014 by a state university, now it takes less than three minutes to identify the finger print and less than thirty minutes to prepare the report. After twelve days of the system launch, 10-print fingerprints of 4,035 people were identified. Out of them 899 were matched with known criminals. That means twenty two percent (22%) of criminals were identified after very few days of the system launch. At present the system is in place and used by the end users. They are uploading all the existing manually collected finger prints and preparing an electronic database. The manual system is fully replaced by the automated system. In the near future, the finger prints which are found at crime scenes will be analysed with the entire finger print database in a short time.

E-government stakeholders and their involvement related to case D is given in Table 5.

Table 5. E-government stakeholders in case D

E-government stakeholders	In this case	Involvement
Service receiver	Police officers	Requirement identification, receiving services such as finger print analysis results and personal identification reports of criminals
Service provider	Police officers	Requirement identification, system testing, training, generating reports
System developer	State university	Requirement identification, system design, system development and implementation, training, maintenance
Top level management	Governors/ Politicians	Decision making, financial support
Consultants	Government agency	Procurement handling
	State university	Innovative ideas, advisory services

ANALYSIS

The 4 cases mentioned are similar in terms of project size, funded by reputed agencies and are successfully developed and implemented. However Case A and B although implemented, have not being continued and used due to many reasons while Case C and D are fruitfully continued and used by the end users. Collapsing of these sorts of projects that consume large amount of human resources, time and money unquestionably have a huge impact on a country's development. Apart from the fact of wastage of manpower, time and money, the suspended projects will discourage the funding agencies in investing more on useful e-government projects in future, which will directly affect the growth of a developing country. Thus, there is a clear need of a sustainable model for e-government projects in this context. One of the senior consultants who engaged in these projects for a greater extent stated;

"In government projects it is important to communicate with the entire hierarchy of governance and system users. It is more important to communicate the problem from the bottom of the hierarchy and make the relevant decisions from the top of hierarchy. That makes sure end users use the system and governors take the right decisions without any delays."

A senior software engineer from case C stated;

"What went well in this project is the step by step implementation approach we followed. First we made them use and adjust to small components of the new system. Then we increased gradually. We are still implementing some modules as this is an enterprise level government system."

Input from the interviewees like above statements motivated us to look into the details of the cases to identify the reasons behind successes and failures to derive potential features that influence long-term sustainability. By deriving such factors we aim to construct a sustainable framework for large scale e-government projects. The below sections will analyze the 4 case studies to derive features useful to construct a framework. As we have identified in Table 1, these 4 cases can be further categorized as (i) BRP e-government systems and (ii) Innovative e-government systems. These 2 categories are analyzed further below.

Analysis of BPR e-government projects

Government organizations like any other industry have started reaching to gain better and more efficient service to its customers, the general public. Nevertheless use of Business Process Reengineering as a modern technique that thrives for business process improvements and creates value are put to practice in both developed and developing countries as a strategic tool to produce high impact on management and transactions on e-government projects (Martín and Montagna, 2006). However as many researchers note (Dharmasena et al. 2013; Heeks, 2003), most cases of e-government projects fail due to multiple reasons, rather implemented but not continued. In our approach to derive a framework to ensure sustainability of e-government projects first we look into BPR e-government projects to identify features that contribute to a project's sustainability.

As BPR projects we have acknowledged Case B, Asset management system for a large scale state-owned organization and Case C; MIS for a large scale state-owned organization. Both projects with the mission to create value to end customer and to ease the process to all the stakeholders seemed to be similar in terms of organizational size and behaviour. However, the Asset Management system has become a utter disaster and had

been taken down while the MIS system is a big success and is currently up and running. The Table 6 summarizes the reasons to succeed and fail in both cases.

Table 6. Success and Failure factors for BPR e-government projects

Reasons to failure: Case B	Reasons to succeed: Case C
The need for re-engineering came from the Top Management. As everyone was using information systems and as there are plenty of encouraging funding bodies available the top management was eager to move to electronic format.	The need for the system came from the lower level employees and the customers (Bottom-up approach). As there were many queues of customers, heavy manual workload employees and customers urged the need for a automated system.
Requirements gathered from the top management, only a few interactions with a few end users.	Consultants gathered requirements from all types of users (all types of users involved).
Deployed a fully functional system at once for testing.	Module-wise development (Incremental). The system is developed, tested and deployed module wise, some modules are still being implemented.
Only IT department was trained, thus at the deployment enterprise wide user training was an issue.	Training was also done incrementally by the developers and consultants; module by module while deploying.
The actual users found it hard to use the system than the manual process as they were not sufficiently trained and they did not want to learn more as they did not understand the value that the information system will bring to their day to day activities.	Eased day-to-day activities of the organization and its employees. Thus they are satisfied and continued to use the system.

With the above analysis of the two cases we see that a project will succeed if the need for the project comes from the actual users of the system rather than the managerial level personnel. This can be identified as a bottom-up approach. Further involvement of all types of e-government stakeholders is crucial for sustainability of the project. Module wise development and deployment although controversial to modern software development approach appear to have gained success to Case C over case B.

Thus, with the analysis we have identified 3 features that contribute to sustainability of a BPR project of e-government in a developing country;

(i) The Approach

(ii) Method of Deployment

(iii) User Involvement

Analysis of Innovative e-government systems

Information technology has become a true enabler for innovations in every industry. Nonetheless electronic governance also benefits from new innovations and innovative ideas brought to play for municipalities (Moon, 2002). Not to be outdone, developing countries also engage in new innovations for government projects to ease the process of governance or to ease the process to the general public. In this research we analyze 2 innovative e-government projects (Case A and Case D) in Sri Lanka to identify the potential sustainability of these projects in a developing country.

As innovative projects we identify Case A: e-Health system for state-owned hospitals and Case D: Information system for a large scale state-owned organization. Both the projects are innovative ideas to ease activities of state owned organizations. Similar to the cases discussed in section 4.1, Case D analyzed here is a huge success and is currently up and running successfully, but Case A although successfully implemented is currently shut down and not in use. The reasons behind the success and failure factors of the Cased A being shut down and Case D being used discussed below in Table 7.

Table 7. Success and Failure factors for innovative projects

Reasons to failure: Case A	Reasons to succeed: Case D
The idea came from the top management and was not conveyed to the lower level/actual users of the	The problem came from the policemen who were struggling to match and identify the fingerprints of criminals. The idea

system.	for the automated system came from the top management and conveyed it to the end users at the initiation.
Requirements gathered from the top management only, no interaction with the actual users of the system.	Further requirements gathered from all types of users involved, top management, middle layer and lower level employees.
System implemented and deployed for the users at once.	System implemented in stages with adequate user involvement.
The users where not ready to accept the system and the change. Users did not see the need for the new process.	Users were aware of the system before deployment and were glad to use the system.

With the above analysis of the two cases we see that a new innovative project will be successfully perceived by the potential users if the idea was properly conveyed to them and the requirements further ideas are gathered from them as they are the ultimate beneficiaries. This can be mapped as a bottom-up approach it gets the initiative from the users. Further, it is identified the involvement of all types of e-government stakeholders are crucial for sustainability of the project. System implementation and deployment done stage by stage seemed to have a advantage in Case D over Case A.

Thus, the above analysis of the two cases also identifies the same 3 features as BPR projects that ensure the sustainability of an innovative e-government project;

(i) The Approach

(ii) Method of Deployment

(iii) User Involvement

Furthermore, we have identified a fourth factor as (iv) User awareness of the new innovation, in cases if innovative e-government projects as it clearly shows a need for users to be aware of the new idea, the new changes brought by the innovative project.

The Framework

As discussed in both sections, section 4.1 and 4.2 it is clear that regardless of the project type (BPR or innovation) all projects succeed if the 3 features; approach, method of deployment and user involvement are bottom-up, incremental and all users respectively. Even though the model by Dharmasena et al. 2013 partially identifies the need for incremental development and deployment as it is solely for BPR projects and mainly targeted at the implementation, there is a potential gap of a high-quality sustainability model for the e-government projects in developing countries. As the context, resources, culture and technology is at a sophisticated level in developed countries it will not be lucrative to use sustainable models developed based upon developed countries. With our findings we have identified a framework that addresses all 3 successive features. The framework consists of 2 sub sections, (i) rationale for bottom up approach of e-government projects (Figure 1) and (ii) e-government project lifecycle for sustainability (Figure 2).

The rationale for bottom up approach of (Figure 1) shows how the interactions and participations of the stakeholders should happen in a e-government project. The model is explained in finer detail below. The purpose of initiating a bottom up approach is to identify, understand and address the actual problems faced by the end users of the e-government processes. Secondly, it is important to build necessary relationships with all the stakeholders to ensure project sustainability.

Actual Beneficiaries - As shown in the model (Figure 1) the need for the project should come from the actual beneficiaries of the system. The actual users are the service receivers (citizens of the country) and the service providers (government employees who provide a service to the general public) of the e-government system.

Government Decision Makers - Once the need for a e-government project, either BPR or innovation is conveyed to the government decision makers, e-government consultants should be recruited by the top management of the government body. Recruiting correct consultants is essential for the project stability as the consultants play a key role throughout the project lifecycle.

Consultants - Consultants provide advices related to the project and are capable of providing a better analysis and understanding of the need in order to propose a suitable (innovative or BPR) e-government system.
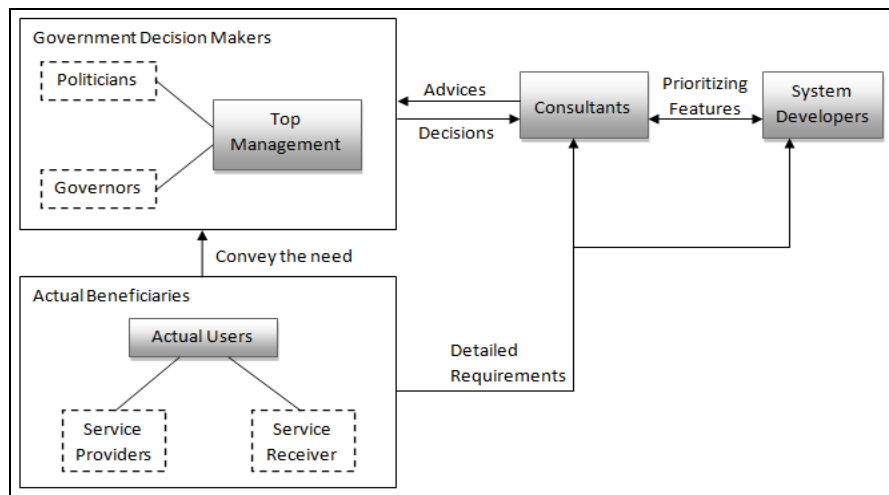
Figure 1. Rationale for Bottom-up Approach

System Developers - The role of system developers come at a later stage, once consultants and the government decision makers decide on advancing with the system. With clear requirements and design the consultants and the developers are involved in prioritizing the features. With the consultant advises, the government decisions and detailed requirements gathered from the actual beneficiaries, a system can be designed more effectively, in terms of its actual use. As the need and the requirements are coming from those who are keen on working in the proposed system once deployed, it's easy to get the functionality right at the initial stages of the project. Moreover, use of bottom up approach will address the issues of system rejection and the difficulty of change management of the users. This approach ensures the system is accepted and the users are readily changed to accept system to be deployed in their environment.

Further we have proposed a lifecycle to be use along with the bottom up approach to gain better sustainability results for a e-government project in developing countries. The proposed e-government project lifecycle for sustainability consists of 2 phases, Phase I - e-government initiative; which influence better initiative by identifying the stakeholders who should be involved, and Phase II - e-government execution; which targets on facilitative efficient and effective execution of the e-government projects. The steps defined in the e-government project life cycle for sustainability (Figure 2) is discussed below into finer details.

Project Idea/The need - The birth of the e-government project is depicted by this step. This could be either a innovative idea or a need for process redesigning as a e-government project. As identified this should be initiated by the actual users (the actual users could be the citizens or the front end employees who are performing the government service) of the e-government system to be used. Further consultants can act as those who systematize these ideas and the need of the e-government coming from the actual users of the proposed system.

Project design - Once a project idea or a need for e-governance is evolved by the actual users the designers and developers, together with the actual users will develop the project design. Also consultation from e-government consultants is vital in this step.

Identify modules - This stage is carried out by the designers and developers with the consultants to identify the modules of the system to be implemented based on the business processes to be carried out in the system.

Prioritize modules - After the modules are established the actual users and consultants should work on prioritizing the modules to be used. The domain expertise of the actual users will help more efficient prioritization of the modules. This prioritization can be based upon the performance measures of the business process to be automated.

Start with the most crucial module - This step is an intermediate step between the e-government initiative phase and the e-government execution stage. At this step a new role is introduced namely, the Module Owner who is from the designer/developer team.

Module requirement gathering - Completion of the phase I will establish and identify most crucial module to start work with. Thus in phase II the work can start with the identified module and thorough requirement gathering should be carried out for this module. The Module Requirement Specification (MRS) can be identified as the documental output of the step.
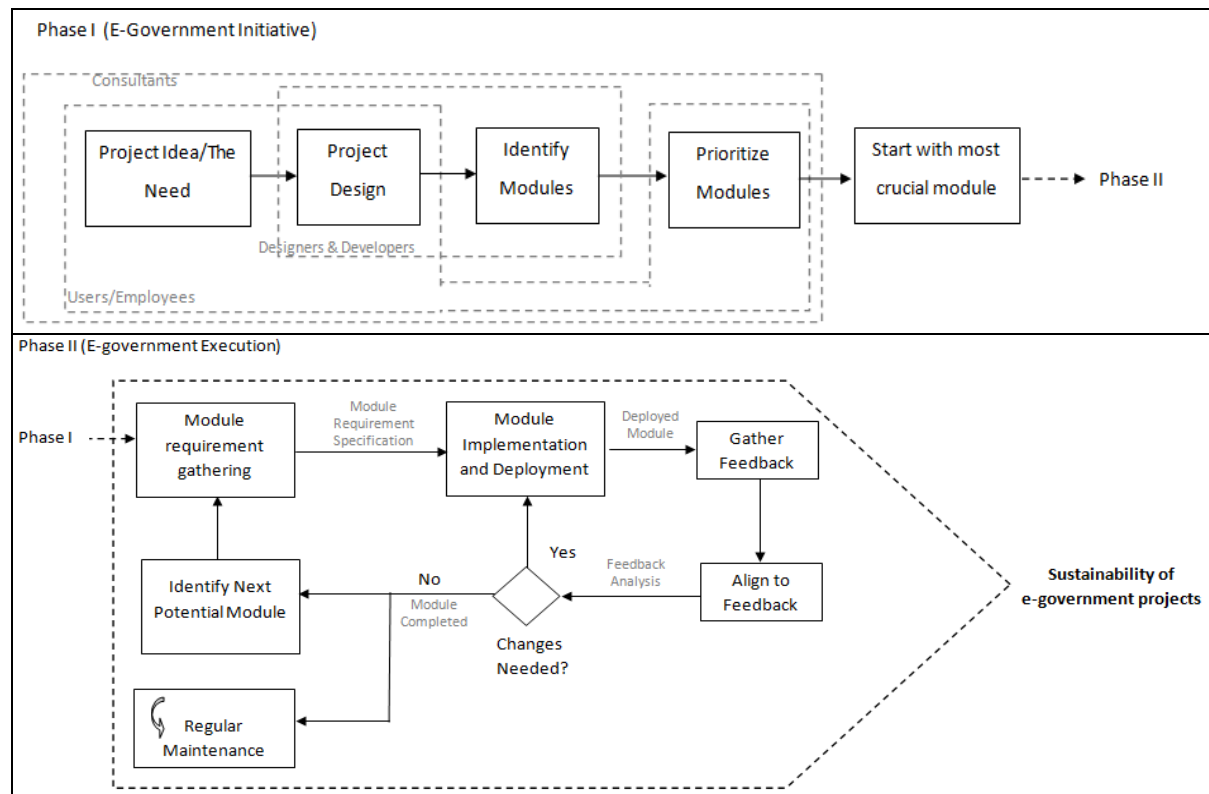
Figure 2. E-government project lifecycle for sustainability

Module Implementation and Deployment - Once the requirements are thoroughly gathered and finalized with the MRS module implementation takes place. When the module implementation is completed and tested it is deployed in the actual environment for the users to work. First deployment can take form of a beta test, if no major issues up and running, module can be deployed for actual use while training is provided by the development team and the consultants.

Gather Feedback - After deployment of the module, user feedback should be gathered to see if the system meets user requirements and performance dimensions.

Align to Feedback - After gathering feedback it should be analysed to identify potential changes in terms of major changes and minor changes to the deployed module.

If changes are needed the team should implement these changes and update the MRS accordingly. If not the next crucial module implementation takes place while regular maintenance should happen for the completed module. The regular maintenance is the responsibility of the module owner. With this approach as the e-government initiative is prompt by the actual users, whom could be the citizens or the employees of the government body who is performing the service, and the system is recurrently evaluated and aligned to their feedback the likelihood of the project to sustain and be used by the actual users increases. Further the development of the module vice requirement specifications (MRS) makes the process more transparent and be later referred to even the users/management/module owners' changes. The allocation of the module owners throughout the project ensures the maintenance of the system thus guarantees the sustainability. The two sub models of the proposed framework, can be used together, or separately for any given e-government project. However for superior results the use of both models together is essential and ensures sustainability.

DISCUSSION

With heavy commercialization brought by the use of internet, many organizations are moving towards electronic business. Government organizations not to be outdone too have started to move towards e-government enabling more efficient service for the general public. Developed countries have initiated and successfully implemented many e-government projects and have assured sustainability in most of them. However, in developing countries there is a potential of e-government projects to be successfully implemented but not continued due to many reasons. Efficient government services will facilitate citizen participation in government and is a factor to improve citizen well being in terms of time, cost, quality and flexibility. In this research by analysing 4 cases of

Sri Lankan success and failure e-government projects we have derived and discussed a framework to be used to achieve sustainability of e-government projects. The identified reasons for e-government project stoppage and the solutions provided by the proposed framework are discussed in the Table 8.

Table 8. Reasons for e-government project stoppage and solutions though the proposed framework

Reasons of e-government projects being suspended	Solutions specified by the proposed framework
The initiative for e-government project comes from the top management or the government. The actual end user involvement for the project comes at a later stage, so the acceptance of the system is at stake.	The need for e-government project should come from the actual beneficiaries. The government bodies can arrange/organize seminars to educate its employs of the e-government and its uses, thus the need for the system could be identified by them. This ensures the projects' acceptance and contributes to its sustainability.
The IT department of the government body is responsible for the e-government project. When the projects are implemented by outside parties they act as the users and the SRS is prepares based on the requirements given by them. They act as intermediaries, but they have ownership of the system to be implemented. Further, training is given to the IT department rather than the actual users.	The role of the IT department has been replaced and enhanced by the role of Consultants. The consultants are outside parties who have no ownership to the process. Thus they take all the requirements from the actual users and beneficiaries. (However IT department might play the role of designer/developer at the implementations and deployment stage or later for maintenance)
The system was deployed to end users after completing implementation. Thus the users find a gap in the actual requirements and the functionality.	The projects should be implemented and deployed module wise. A Module Requirement Specification is prepared by the consultants by gathering requirements from the actual beneficiaries of the system, thus there will be no gap between the requirements and the functionality.
The actual user involvement only comes at the later stages of the project. Mainly after deployment of the project. This leads slowly dying projects as users find it hard to embrace the system.	As the actual users are actively involved in the system design activities they are familiar with the system functionality before being implemented. This leads to thriving systems which achieves sustainability.
The developing body (could be outsourced) is responsible for maintaining the system. Sometimes due to arrangements with the developing body the maintenance is done by the IT department. Even though maintenance plays a key role in a projects' sustainability, maintenance get a low priority in these projects. Having no specific role assigned for this responsibility is a major reason behind this.	With our framework, we introduce a new role, the Module Owner who is responsible for taking necessary action for the module maintenance.

The features of the framework we propose are derived by the 2 success cases discussed. Thus we recommend that this model will ensure sustainability of e-government project of any type, either reengineering or an innovation in a developing country.

FUTURE WORK

Even though it is verified that Sri Lankan e-government projects can benefit using the proposed framework of sustainability, this model may be further evaluated with respect to several other developing countries to identify if this can be used as a general sustainable framework or if it needs extension. Moreover, the model has to be evaluated against distributed government systems to ensure that it can be used for such large scope e-government projects as well. This framework can further extended to be developed as an Enterprise Architecture framework for e-government sustainability in developing countries.

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ACKNOWLEDGMENTS

APPENDIX 1

#	Questions
1	Please give a brief description of the project; timeframe, domain, scope, technology, key events and overall lifecycle
2	Who are the people involved and their interactions? i.e. development team, external stakeholders, decision makers
3	As per your opinion what are the things that went wrong?
4	As per your opinion what are the things that went well?
5	If you give advice to someone starting a similar project, what would you say? What are the recommendations and things to avoid?
6	How would you prioritise the activities and the relevant people interactions?
7	Are there any other thoughts you like to share through your experience on this or any other similar projects that you have involved in?

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